

(Considered Single - Shared with others outside the specialization – Published in International Journal).

Natural Biostimulant Attenuates Salinity Stress Effects in Chili Pepper by Remodeling Antioxidant, Ion, Phytohormone Balances, and Augments Gene Expression.

Plants 2021, 10, 2316. <https://doi.org/10.3390/plants10112316>

Alaa I. B. Abou-Sreea ¹, Clara R. Azzam ^{2,*}, Sudad K. Al-Taweel ³, Ranya M. Abdel-Aziz ⁴, Hussein E. E. Belal ⁵, Mostafa M. Rady ⁵, Atef A. S. Abdel-Kader ⁶, Ali Majrashi ⁷ and Khaled A. M. Khaled ⁸

¹ Department of Horticulture, Faculty of Agriculture, Fayoum University, Fayoum 63513, Egypt;

² Cell Research Department, Field Crops Research Institute, Agricultural Research Center, Giza 12619, Egypt

³ Department of Field Crops, College of Agriculture Engineering Sciences, University of Baghdad, Al-Jadiriya, Baghdad, Iraq;

⁴ Tissue Culture Lab., Sugar Crops Research Institute, Agriculture Research Center, Giza 12619, Egypt;

⁵ Botany Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt;

⁶ Department of Medicinal and Aromatic Plants, Horticulture Research Institute, Agricultural Research Center, Giza 12619, Egypt;

⁷ Department of Biology, College of Science, Taif University, P.O. Box 11099, Taif 21944, Saudi Arabia;

⁸ Genetics Department, Faculty of Agriculture, Beni-Suef University, Beni Suef 62513, Egypt

Article status	Considered Single - Shared with another outside the specialization – Published in	Impact Factor: 4.659
----------------	---	--------------------------------

Abstract

A biostimulant is any microorganism or substance used to enhance the efficiency of nutrition, tolerance to abiotic stress and/or quality traits of crops, depending on its contents from nutrients. Plant biostimulants like honey bee (HB) and silymarin (Sm) are a strategic trend for managing stressed crops by promoting nutritional and hormonal balance, regulating osmotic protectors, antioxidants, and genetic potential, reflecting plant growth and productivity. We applied diluted honey bee (HB) and silymarin-enriched honey bee (HB-Sm) as foliar nourishment to investigate their improving influences on growth, yield, nutritional and hormonal balance, various osmoprotectant levels, different components of antioxidant system, and genetic potential of chili pepper plants grown under NaCl-salinity stress (10 dS m⁻¹). HB significantly promoted the examined attributes and HB-Sm conferred optimal values, including growth, productivity, K⁺/Na⁺ ratio, capsaicin, and Sm contents. The antioxidative defense components were significantly better than those obtained with HB alone. Conversely, levels of oxidative stress markers (superoxide ions and hydrogen peroxide) and parameters related to membrane damage (malondialdehyde level, stability index, ionic leakage, Na⁺, and Cl⁻ contents) were significantly reduced. HB-Sm significantly affects inactive gene expression, as a natural biostimulator silencing active gene expression. SCoT primers were used as proof in salt-treated or untreated chili pepper plants. There were 41 cDNA amplicons selected by SCoT-

primers. Twenty of them were EcDNA amplicons (cDNA-amplicons that enhanced their genes by one or more treatments) representing 49% of all cDNA amplicons, whereas 7 amplicons for ScDNA (whose genes were silenced in one or more treatments) represented 17%, and 14 McDNA (monomorphic cDNA-amplicons with control) amplicons were represented by 34% from all cDNA amplicons. This indicates the high effect of BH-Sm treatments in expression enhancement of some inactive genes and their silenced effect for expression of some active genes, also confirming that cDNA-SCoT markers succeeded in detection of variable gene expression patterns between the untreated and treated plants. In conclusion, HB-Sm as a natural multi-biostimulator can attenuate salt stress effects in chili pepper plants by remodeling the antioxidant defense system and ameliorating plant productivity.